Archaeomagnetic dating of ancient kilns: a promising dating tool for archaeological research.

How precise can it be?

Tema E.[(1)], Casas Ll.[(2)]

(1) *Dipartimento di Scienze della Terra, Università degli Studi di Torino, via Valperga Caluso 35, 10125, Torino, Italy, evdokia.tema@unito.it*

(2) *Departament de Geologia, Universitat Autònoma de Barcelona, Campus UAB, 08193, Bellaterra, Catalonia, Spain, lluis.casas@uab.cat*

Dating is a significant part of archaeological research and in the cases that age diagnostic artefacts and chronological evidences are missing, the use of laboratory scientific dating techniques is very important. Archaeomagnetic dating is a promising dating technique, based on the ability of baked clay archaeological structures and artefacts to acquire a thermal remanent magnetization (TRM) when heated at high temperatures and cooled in the presence of the Earth's magnetic field. The accuracy of archaeomagnetic dating depends on several factors, among others the availability of a detailed reference secular variation (SV) curve for the given territory. Nowadays, the establishment of well constrained SV curves for several European countries and the development of geomagnetic field models make archaeomagnetism a powerful dating tool.

In this study, the precision of archaeomagnetic dating at different time periods is exploited using artificial data and reference SV curves calculated by regional geomagnetic field models. Examples of archaeomagnetic dating of kilns from Italy and Spain are also reported in order to investigate the dating precision when dealing with real data coming from experimental laboratory geomagnetic field determinations. Results show that in several cases dating can be very precise with uncertainty errors limited to some decades. Archaeomagnetic dating is also compared with thermoluminescence results. Both archaeomagnetic and thermoluminescence dating techniques have the advantage to date exactly the same event that is the last firing of ceramics and last use of pottery kilns and can be therefore considered as the most appropriate techniques for dating of such materials.

Archaeomagnetic dating based on the full geomagnetic field vector is the best approach. However, recent results from two pottery kilns at Osterietta (Italy) show that for the last 700 years, archaeointensity results do not improve dating due to the smooth variation of the Earth's magnetic field intensity in this period.